49-58-2-17/18

A Universal Formula for Rate of Descent of a Sphere in Fluid.

(*This figure is indecipherable: it could be 3, 5 or 9.)

$$\Phi(x) = x\left\{1 - \frac{*}{16}x + \frac{109}{1280}x^2 - \frac{1031}{20480}x^3 + \dots\right\}. \quad \text{(Eq.7)}$$

For $x \ll 1$, putting $\Phi(x) = x$, we obtain from Eq.6

$$v = v_{CT} = \frac{\mu}{2\rho a}\alpha a^3 = \frac{2}{9}\frac{\sigma g}{\mu}a^2. \quad \text{(Eq.8)}$$

This is Stoke's formula for the rate of descent of a sphere. Retaining in formula 7 all the terms quoted, $\Phi(x)$ can be evaluated for $x \leq 1$ to an accuracy of 3% (the first neglected term is $0.03x^4$). For large x, assuming that for large Re C_D varies little (between 0.4 and 0.6), and putting it approximately constant and equal to C_D^o, we find

$$\Phi(x) = \sqrt{\frac{24}{C_D^o}x} = \beta\sqrt{x}, \quad \beta = \sqrt{\frac{24}{C_D^o}} \quad \text{(Eq.9)}$$

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49-58-2-17/18

A Universal Formula for Rate of Descent of a Sphere in Fluid.

Hence from Eq.6 we obtain a formula for the rate of descent of a large sphere*:

$$v = \frac{\mu}{2\rho a}\sqrt{\frac{24}{C_D^o}\sigma a^3} = \eta\sqrt{a}, \qquad \eta = \sqrt{\frac{8}{3}\frac{\sigma g}{\rho C_D^o}} \qquad \text{(Eq.10)}$$

For intermediate values of x the calculated values of the function $\Phi(x)$ (taken from Table 5 from Ref.4) are given in the table on p.282. The general behaviour is indicated on Fig.1 (both scales are logarithmic). The straight line on the graph corresponds to Stokes' formula.

Taking into account the limiting formulae 7 and 9 the following simple interpolation formula for $\Phi(x)$ for any x is proposed:

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* This formula has previously been obtained in Ref.6.

49-58-2-17/18

A Universal Formula for Rate of Descent of a Sphere in Fluid.

$$\Phi(x) = \frac{x}{1 + \frac{1}{\beta}\sqrt{x}} . \qquad \text{(Eq.11)}$$

The maximum error given by this simple formula for $\frac{1}{\beta} = 0.150$ (which corresponds to $C_D^0 \approx 0.5$) in the entire interval of x is 14%. To this accuracy we have the following interpolation formula for the rate of descent of an arbitrary sphere in any fluid:

$$v = \frac{v_{cr}}{1 + 0.15\sqrt{\alpha a^3}} . \qquad \text{(Eq.12)}$$

This formula superficially corresponds to the empirical formula of Schmidt (Eq.1) Its advantage, however, is that it explicitly contains the physical properties of the sphere and the fluid. It applies to any sphere and any fluid.

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49-58-2-17/18

A Universal Formula for Rate of Descent of a Sphere in Fluid.

If the interval of x is diminished, then it is possible to increase the accuracy of formula 11 taking, with the aid of the table for $\xi(x)$, a better value for the coefficient of $\sqrt{x}$ in the denominator. For accurate calculations it is necessary to use formula 6 and the table for $\xi(x)$.

This is a complete translation, omitting table on p.282.

There is 1 figure, 1 table and 6 Russian references.

ASSOCIATION: All-Union Forestry Correspondence Institute. (Vsesoyuznyy zaochnyy lesotekhnicheskiy institut.)

SUBMITTED: March 22, 1957.

AVAILABLE: Library of Congress.

Card 9/9

SHIFRIN, K.S.

Transactions of the Laboratory (~~Contr~~) of Aeromethods, AS USSR SOV/3815
V.7, Materials of 7th AU Interdept Conf. Aerial Survey (Dec 56), Moscow, 1959, 331pp.

Card 4/15

SHIFRIN, K. S.

"Spectral Properties of Clouds."

paper presented at Symposium on Radiation and Atmospheric Ozone, Oxford, UK, 20-26 July 1959

SOV/49-59-1-15/23

AUTHORS: Shifrin, K. S. and Minin, I. N.

TITLE: Non-Horizontal Visibility Below a Continuous Layer of Cloud (Negorizontal'naya vidimost' pri sploshnoy oblachnosti)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1959, Nr 1, pp 131-138 (USSR)

ABSTRACT: Visibility in the atmosphere below a continuous layer of cloud is considered. A formula for calculating the contrast K is given, p 131, where h - height of the observation point, Θ - angle of observation, $B_o^o(\lambda)$ - brightness of an object on the Earth's surface, the brightness of which is $B_\Sigma^o(\lambda)$, λ - wavelength, $D(\lambda)$ - brightness of the haze, $\tau_o^h(\lambda)$ - optical thickness of the air layer, F_1, F_2, F_3 - energy streams from the object, Earth's surface and haze respectively, L - distance from the object, ε - limit of sensitivity of the visibility meter. The non-horizontal distance L can be found from the expression

$$K(L) = \varepsilon$$

Card 1/4

or

$$L = K^{-1}(\varepsilon).$$

The coefficient of diffusion is given by Eq.(1), the thickness of the air layer by Eq.(2) and the optical thickness by Eq.(3). The brightness of the air haze can be calculated from Eq.(4) (Ref 3) or Eq.(5) where $J(\tau_0', \Theta) = \sigma(\Theta)$. In the general case, this equation can be written in the form of Eq.(6). The conditions satisfying Eq.(6) are shown in Fig.1 and Table 1. The brightness of the cloud haze can be calculated from Eq.(7) where D is found experimentally (Ref 1). A mean D can be calculated from Eq.(8). Thus $J(\Theta)$ becomes simplified as is shown in Eq.(9). The integral of this equation can be evaluated and presented as Eq.(10) when correction for height of the Sun $i = 20$ to 80° is applied. The spectral brightness of the Earth's surface can be calculated from Eq.(11) where $I_0(\lambda)$ - stream of parallel rays from the cloud. That part of the light which falls from a portion of cloud at an angle of $d\omega$ can be found from Eq.(12).

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Non-Horizontal Visibility Below a Continuous Layer of Cloud

Substituting $J(\tau'_o, \Theta)$ from Eq.(4), the Eq.(13) is obtained, while the total illumination by the whole sky can be found from Eqs.(14), (15) and (16) where $\Phi(\lambda)$ is spectral illumination. The tables of Φ were made for the values of τ_o ranging from 0.00 to 0.50 and for A from 0.0 to 1.8 (Table 2). As can be seen, the value of Φ can be considered as constant and equal to about 2. The calculation of the brightness of the Earth's surface can also be based on its own spectral illumination $E(\lambda)$. The ratio of $E(\lambda)/J(\lambda)$ can be found from Eq.(18), thus the brightness of the cloud can be expressed as Eq.(19) and the coefficient ε calculated from Eqs.(20)-(22). How the value of ε depends on λ can be shown in an example for $S_o = 20$ km, $\tau_o = 0.3$, $\Theta = 60^o$. Taking A = 0.2, the following computation can be performed:

$$(1 - A)\left(1 + \frac{3}{2}\cos\Theta\right) + 2A = 1.8,$$

$$\phi(\tau^o, A) = 0.9\left[4 + (3 - x_1)\,0.7\,\tau_o\right] = 3.6 + 1.3\,\tau_o.$$

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SOV/49-59-1-15/23

Non-Horizontal Visibility Below a Continuous Layer of Cloud

The result is shown in Table 3. It can be seen that the deformation of the spectral curve of brightness distribution, downwards from the cloud base of 1.53 km, does not exceed 12%. When the cloud base is relatively high (i.e. 2-4 km in the summer) a correction should be applied in Eq.(6). This can be found from Eqs.(23) and (24) where η and τ are found experimentally for the values of Θ equal 45 and 60° (Table 4). Similar tables can be made for various η and τ. Thus, knowing τ it will be easy to determine the decrease in illumination of an object and the Earth's surface or of the brightness of the haze, thus determining the contrast K.

There are 1 figure, 4 tables and 6 references, all of which are Soviet.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya im.A.I.Voyeykova (Main Geophysical Observatory imeni A.I.Voyeykov)

SUBMITTED: September 23, 1957

Card 4/4

SHIFRIN, K.S.

Work at the Main Geophysical Observatory on physical foundations of aerial photography. Trudy Lab.aeromet. 7:70-73 '59. (MIRA 13:1)

1. Glavnaya geofizicheskaya observatoriya im. A.I.Voyeykova.
(Photography, Aerial)

SHIFRIN, K.S.

PHASE I BOOK EXPLOITATION SOV/4147
SOV/2-S-100

Leningrad. Glavnaya geofizicheskaya observatoriya

Issledovaniye radiatsionnykh protsessov (Investigation of Radiation Processes). Leningrad, Gidrometeoizdat, 1960. 197 p. (Series: Its: Trudy, vyp. 100) Errata slip inserted. 1,000 copies printed.

Additional Sponsoring Agency: USSR. Glavnoye upravleniye gidrometeorologicheskoy sluzhby.

Ed. (Title page): K.S. Shifrin, Doctor of Physics and Mathematics, and V.L. Gayevskiy, Candidate of Geography; Ed. (Inside book): L.P. Zhdanova; Tech. Ed.: M.I. Braynina.

PURPOSE: The publication is intended for meteorologists and students of hydrometeorology at higher technical schools.

COVERAGE: This issue of the Transactions of the Main Geophysical Observatory imeni A.I. Voyeykov contains 27 articles on investigations of the radiation processes

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occurring in the atmosphere and on the active surface. Individual articles on the following topics are included: light dispersion in a two-layered atmosphere, comparative analysis of sighting conditions under a cloudy and a cloudless sky, investigation of long-wave radiation of the atmosphere, electronic temperature controller, aircraft instruments for measuring the spectral optical characteristics of the atmosphere and the underlying surface, and the dependence of long-wave atmospheric radiation upon the meteorological elements. References accompany each article.

TABLE OF CONTENTS:

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549410012-4"

33060

S/169/61/000/012/060/089
D228/D305

3,5150

AUTHORS: Shifrin, K. S., and Avaste, O.

TITLE: Shortwave radiation flows in the cloudless atmosphere

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 12, 1961, 25, abstract 12B167 (V sb. Issled. po fiz. atmosfery. 2. Tartu, 1960, 23-66)

TEXT: The aim of the work is the construction of a scheme for calculating shortwave radiation flows in the 0.29 - 4 μ spectral region in a layer with a height of up to 30 km. It is a question of calculating "pyranometric" flows at different levels for a cloudless atmosphere. The actual atmosphere is considered as a superimposition of a molecular atmosphere of set composition on an aerosol atmosphere. The following model is taken for the dispersion coefficient on aerosol particles:

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D228/D305

Shortwave radiation...

$b = b_1 + b_2$; $b_1 = b_0 e^{-\beta z}$; $b_2 = \text{const.}$ Two variable parameters--b_0 and β--may be determined from data about the vertical optical thickness (τ_0) and the horizontal range of visibility. Thus, a closed biparametric model of the actual atmosphere is obtained. In the ozone layer, the weakening of radiation is calculated at an average content of 25 cm. This permits the "subzone" flow irradiating the underlying 20 km layer to be determined. Simple formulas are introduced for calculating the intensity and illumination at different levels. Comparison of the brightness data calculated from the derived formulas with the tables of the Institut fiziki atmosfery (Institute of Physics of the Atmosphere) shows that in the worst case they give an error of about 10% for $\tau_0 = 0.35$. This provided the basis for carrying out detailed calculations of the brightness of atmospheric haze and the distribution of the brightness of the daytime

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Shortwave radiation...

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sky under typical atmospheric conditions. The results of the calculations are adduced in tables. Absorption in the region for H_2O and CO_2 is calculated using the experimental absorption functions of Havard, Birch, and Williams. The intensities of direct solar radiation and of the haze and sky brightness in the infrared region are computed for different levels. Calculations are given for three quantities of precipitated water: 0.5, 2.1, and 3 cm. 50 references. [Abstracter's note: Complete translation.]

Card 3/3

SHIFRIN, K.S.; PEREL'MAN, A.Ya.

Kinetics of cloud crystallization. Izv.AN SSSR.Ser.geofiz. no.6:839-853 Je '60. (MIRA 13:6)

1. Vsesoyuznyy zaochnyy lesotekhnicheskiy institut.
(Cloud physics)

S/044/62/000/005/008/072
C111/C333

AUTHORS: Shifrin, K.S., Novosel'tsev, Ye.P.

TITLE: The examination of a class of definite integrals containing the square of a Bessel function of first order

PERIODICAL: Referativnyy zhurnal, Matematika, no. 5, 1962, 7, abstract 5B35. ("Tr. Gl. geofiz. observ.," 1960, no. 100, 25-36)

TEXT: The authors consider integrals

$$\Psi_k(\mu) = \int_0^{\infty} z^k e^{-\mu z} J_1^2(z)dz \quad (2 < k < +\infty;\ 0 < \mu < +\infty)$$

which contain the square of a Bessel function of first order. For fractional k and $\mu \geqslant 2$ the calculation of $\Psi_k(\mu)$ is carried out with the help of the series

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The examination of a class of ... S/044/62/000/005/008/072
C111/C333

$$\varphi_k(\mu) = \sum_{m=0}^{\infty} \frac{(-1)^m \Gamma(2m+3)\Gamma(k+2m+3)}{2^{2m+2}\Gamma(m+1)\Gamma(m+3)\Gamma^2(m+2)} \times \frac{1}{\mu^{k+2m+3}}$$

which converges for $\mu \geqslant 2$. It is proven that the function $\varphi_k(\mu)$ can be represented for every μ using the contour integral

$$\varphi_k(\mu) = \frac{1}{2\pi i}\int_L \frac{\Gamma(2z+3)\Gamma(k+2z+3)\Gamma(-z)}{2^{2z+2}\Gamma(z+3)\Gamma^2(z+2)\mu^{k+2z+3}}\,dz$$

where L denotes the imaginary axis with a cut in the vicinity of z = 0. The point z = 0 is circumscribed in the left half-plane along an infinitely small semi-circle. In addition to the function $\varphi_k(\mu)$, the generalized functions

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$$\varphi_k^{\gamma}(\mu) = \int_0^{\infty} z^k e^{-\mu z^{\gamma}} J_1^2(z)dz$$

$$(2 < k < +\infty; \quad 0 < \mu < +\infty \; ; \quad \gamma > 0)$$

are also considered.

[Abstracter's note: Complete translation.]

SHIFRIN, K.S.; PEREL'MAN, A.Ya.

Kinetics of distillation in a supercooled system. Dokl.AN SSSR 132 no.5:1148-1151 Je '60. (MIRA 13:6)

1. Vsesoyuznyy zaochnyy lesotekhnicheskiy institut. Predstavleno akademikom A.N. Frumkinym.
(Distillation) (Supercooling)

SHIFRIN, K. S., and AVASTE, O. A.

"The Fiend of Short-wave Radiation in Case of a Clear Sky.'

report submitted in connection with the Symposium on Radiation
Vienna, Austria, 14-19 Aug 1961
(paper read by V. G. Fesenkov)

SHIFRIN, K.S., doktor fiz.-mat. nauk, prof., red.; MIRONENKO, Z.I., red.; VLADIMIROV, O.G., tekhn. red.

[Actinometry and atmospheric optics] Aktinometriia i atomosfernaia optika. Trudy. Pod red. K.S.Shifrina. Leningrad, Gidrometeor. izd-vo, 1961. 312 p. (MIRA 14:9)

1. Mezhvedomstvennoe soveshchaniye po aktinometrii i atmosfernoy optike. 2nd. 2. Glavnaya geofizicheskaya observatoriya, Leningrad (for Shifrin).
(Meteorological optics—Congresses)

S/169/62/000/005/051/093
D228/D307

3,5150

AUTHORS: Shifrin, K. S. and Raskin, V. F.

TITLE: The theory of the atmospheric indicatrix of scattering

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 5, 1962, 28, abstract 5B192 (V sb. Aktinometriya i atmosfern. optika, L., Gidrometeoizdat, 1961, 178-186)

TEXT: Proceeding from an approximate method of examining the scattering and the absorption of light by particles, whose properties are not too different from those of the surrounding medium (soft particles), the authors construct a quantitative theory for the optical properties of atmospheric haze. A formula of the scattering indicatrix is introduced for the Rokar distribution, and the error, allowed by Rokar when deducing his well-known atmospheric indicatrix formula, is rectified. A formula is derived for the polydispersed coefficient of scattering of atmospheric haze with the same distribution. The optics of atmospheric haze with the Young distribution is calculated; an approximate formula is derived for the

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D228/D307

The theory of the ...

scattering indicatrix in the case of the Young distribution, and it is shown that the formula can be utilized with a precision of 10% for scattering angles greater than 5°. A more complex formula, accurate for the scattering angle ß = 0, is introduced. A scale is calculated for the special function, required in the computation of the indicatrix. A formula is derived for the coefficient of scattering of atmospheric haze with the Young distribution. [Abstracter's note: Complete translation.]

B

Card 2/2

S/272/63/000/002/004/009
E032/E114

AUTHORS: Shifrin, K.S., and Golikov, V.I.

TITLE: Determination of the droplet spectrum by the small-angle method

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk, Metrologiya i izmeritel'naya tekhnika, no.2, 1963, 50-51, abstract 2.32.354. (In collection: Issled. oblakov, osadkov i grozovogo elektrichestva (Studies of clouds, precipitations and thunderstorm electricity), M., AN SSSR, 1961, 266-277)

TEXT: A method is described for determination of the micro-structure of clouds and mist from the change in the intensity of light scattered at small angles. A description is also given of the laboratory apparatus for the realization of this method. The light source in this apparatus is a type СВДШ-250 (SVDSh-250) lamp with a stabilized supply source. A condenser lens of 9 cm focal length is used to direct the radiation from the lamp onto a narrow-band interference filter with λ_{max} = 546 mμ and focus it

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on an iris diaphragm reduced to a minimum aperture of about 0.25 mm. A collimating lens with f = 20 cm and a diameter of 6 cm is used to produce a parallel beam of light. It was possible to obtain a minimum divergence of 5' with these lens parameters. The existing diaphragm ensures the necessary beam diameter and limits the amount of light scattered by the lens. Plane parallel specimens or containers are fixed on a special table immediately in front of the diaphragm. It is followed by a further lens with f = 35 cm and a diameter of 5 cm. The photomultiplier diaphragm of 1.3 mm diameter is placed at the focus of the latter lens and the output of the photomultiplier is fed into an amplifier. An СД-2 (SD-2) synchronous motor is used for continuous displacement of the photomultiplier and the diaphragm over a path of 10 cm. The entire apparatus is placed in a room with black walls and ceiling. Auxiliary screens and diaphragms are used to exclude extraneous light. With the above optics parameters the apparatus has an angular resolution of $\beta = 2.5 - 5'$ and a minimum angle of approach to the zero angle direction of $\beta_{limit} = 13'$. The indications are read-off from a graduated dial and recorded by a ПСР -01 (PSR-01) potentiometer on a chart. A complete record of the curve is obtained in 10-15 min for plane parallel specimens. The results are given of a comparison between the small-angle and microphotographic methods. It is shown that the accuracy of the two methods is 20-25% and 25-30% respectively. The limitations of the methods are enumerated. They are: 1) the scattering particles should not be too densely packed so that interference phenomena may be excluded; 2) the optical thickness of the illuminated volume should be much less than 1 in order to prevent secondary scattering for which the theory does not hold; 3) the maximum particle radius is limited by the minimum value of β_{limit} at which measurements begin. i.e. by the radius of the central spot in the focal plane of the final lens (in this apparatus $\beta_{limit} \simeq 4\text{-}3$ radians). Hence, the maximum particle radius is $a_{max} = 100\ \mu$. 4) The minimum particle radius determined from exact calculations is found to be 2 μ. 14 figures. 3 references.

[Abstractor's note: Complete translation.]

S/196/62/000/008/010/017
E032/E514

3,5150

AUTHORS: Shifrin, K.S. and Pyatovskaya, N.P.

TITLE: Calculations of the oblique visibility range and brightness of cloudless sky

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no.8, 1962, 3, abstract 8V12. (Sb. "Aktinometriya i atmosfern. optika". L., Gidrometeoizdat, 1961, 262-270)

TEXT: Experimental data on the optical properties of the atmosphere are used to develop a simple scheme for calculating the vertical and oblique visibility range (OVR) for different states of the atmosphere, objects, backgrounds etc. Use is made of the approximate method of solution of the problem of scattering of light in a plane turbid medium (method of V.V. Sobolev). The initial parameters which unambiguously determine the optical state of the atmosphere are chosen to be: total optical thickness of the atmosphere in the vertical direction and the horizontal visibility range at the Earth's surface. Auxiliary tables given in the paper facilitate rapid calculations

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VB

Calculations of the oblique ... S/196/62/000/008/010/017
E032/E514

of OVR for any atmospheric parameters. The coefficients of brightness of the object and the background for a given viewing angle must be determined experimentally.
4 figures, 10 references.

ASSOCIATION: GGO, Leningrad

[Abstractor's note: Complete translation.]

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APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549410012-4"

32279

S/169/61/000/011/038/065
D228/D304

3,5150

AUTHORS: Shifrin, K.S., and Raskin, V.F.

TITLE: Atmospheric indicatrix corresponding to the generalized Junge distribution

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 11, 1961, 27, abstract 11B195 (Tr. Gl. Geofiz. observ., no. 109, 1961, 155 - 160)

TEXT: The optical characteristics (the indicatrix of scattering and the coefficient of scattering) of polydispersed aerosol systems with a Junge type distribution were obtained by theoretical means. It is possible to state on the grounds of experimental data that the microstructure in the troposphere's middle and upper layers may be described by the formula:

$$f(a) = A/a^n \qquad a \geqslant a_{min}$$

$$f(a) = 0 \qquad 0 < a < a_{min}.$$

This kind of distribution is termed the generalized Junge distribu-

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Atmospheric indicatrix corresponding ... S/169/61/000/011/038/065
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tion by the authors. Formulas for the indicatrix of scattering and the coefficient of scattering of polydispersed aerosol systems consisting of particles of the environment ("soft particles") are introduced in the work with n equal to 5 and 6. Indicatrices corresponding to n = 5 and n = 6 are tabulated on the basis of the derived formulas. [Abstractor's note: Complete translation].

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SHIFRIN, K.S.; RASKIN, V.F.

Mean indicatrix in case of gamma-distribution. Trudy GGO no.109: 161-167 '61. (MIRA 14:5)
(Meteorological optics)

SHIFRIN, K.S.

Microstructural calculations. Trudy GGO no.109:168-178 '61. (MIRA 14:5)
(Cloud physics)

SHIFRIN, K.S.

Calculating the radiation characteristics of clouds. Trudy GGO no.109:179-190 '61. (MIRA 14:5)
(Meteorological optics)

SHIFRIN, K.S.; RASKIN, V.F.

Spectral transmittance and the inverse problem of the theory of scattering. Opt. i spektr. 11 no.2:268-271 Ag '61.
(Light--Scattering)
(Meteorological optics)

SHIFRIN, K.S.; RASKIN, V.F.

Sensitivity of the polydispersion indicatrix to the shape of the distribution curve. Dokl. AN SSSR 137 no. 1:64-67 Mr-Ap '61. (MIRA 14:4)

1. Glavnaya geofizicheskaya observatoriya im. A.I. Voyeykova. Predstavleno akademikom A.A. Lebedevym.
(Colloids—Optical properties) (Aerosols—Optical properties) (Light—Scattering)

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ACCESSION NR: AR4047585 S/0169/64/000/009/B011/B011

8
B

SOURCE: Ref. zh. Geofizika, Abs. 9B89

AUTHOR: Shifrin, K. S.; Golikov, V. I.

TITLE: Method and instrument for determining the microstructure of clouds and fogs

CITED SOURCE: Tr. Vses. nauchn. meteorol. soveshchaniya, 1961. T. 9. L., Gidrometeoizdat, 1963, 277-284

TOPIC TAGS: meteorological instrument, cloud, fog, cloud physics, fog physics, cloud droplet, artificial fog, cloud chamber

TRANSLATION: The method and instrument were based on an analysis of information on the properties of a polydisperse system of drops contained in small angles of the indicatrix of scattering. There is a single-valued relationship between the sizes of the particles at small angles. The authors present formulas which make it possible to use the measured angular distribution of light scattering to determine the drop-size distribution. The instrument is a photometer consisting of a collimater and an entrance objective in whose focal plane there is a moving light detector with a point diaphragm for measurement of the angular distribution

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of scattered light. Using this instrument, it is possible to measure the drop-size distribution in artificial fogs in a cloud chamber. The drop-size distributions obtained by the small angles method using this instrument were compared with the distributions found using flow traps. The microstructura of surface fogs was measured. It was found from theoretical computations and experimental data that the ordinates of the drop-size distribution are determined by the optical method with an accuracy to ±5% near the maximum and ±20-25% near the base of the drop-size distribution curve. The article includes the parameters of the measuring system of the instrument and discusses the difficulties in analysis of the experimental data and the possibilities of its automation. V. Golikov

ASSOCIATION: None

SUB CODE: ES ENCL: 00

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S/269/63/000/003/008/036
A001/A101

AUTHORS: Avaste, O., Moldau, Kh., Shifrin, K. S.

TITLE: The spectral distribution of direct and scattered radiation

PERIODICAL: Referativnyy zhurnal, Astronomiya, no. 3, 1963, 27, abstract 3.51.221 (In collection: "Issled. po fiz. atmosfery", 3, Tartu, 1962, 23 - 71, English summary)

TEXT: The authors present the results of calculations of spectral distribution of direct solar and scattered radiations at various atmospheric turbidities, taking into account absorption by vapor, carbon dioxide, and ozone. Calculations for the standard radiation model of the atmosphere agree well with average experimental data. An approximate formula is proposed for taking into account the effect of albedo on descending flux of scattered radiation in the case of true absorption. It is shown that the observed extension of atmospheric scattering indicatrix with increasing wavelength follows directly from the model by K. S. Shifrin and I. N. Minin. There are 25 references.

Authors' summary

[Abstracter's note: Complete translation]

Card 1/1

S/053/62/076/004/001/004
B102/B104

AUTHORS: Imyanitov, I. M., Shifrin, K. S.

TITLE: Contemporary state of research in atmospheric electricity

PERIODICAL: Uspekhi fizicheskikh nauk, v. 76, no. 4, 1962, 593 - 642

TEXT: The main problems of atmospheric electricity are reviewed. In particular, the paper discusses the work of Ya. I. Frenkel' on fundamental problems in geophysics, including atmospheric electricity. The literature of the last ten years is reviewed; reference is made also to earlier papers of importance. There are 33 figures and 7 tables.

Card 1/1

NIKANDROV, V.Ya., doktor fiz.-matem. nauk, red.; SHIFRIN, K.S., doktor fiz.-mat. nauk, red.; BELEN'KAYA, L.L., red.; MIRONENKO, Z.I., NIKOLAYEVA, G.S., tekhn. red.; GOL'TSBERG, I.A., doktor geogr. nauk, red.; NEDOSHIVINA, T.G., red.; NIKOLAYEVA, G.S., tekhn. red.; ARONS, R.A., tekhn. red.; SERGEYEV, A.N., tekhn. red.

[Transactions of the All-Union Scientific Meteorological Conference] Trudy Vsesqiuznogo nauchnogo meteorologicheskogo soveshchaniia. Leningrad, Gidrometeoizdat. Vol.5. [Section on the physics of the free atmosphere] Sektsiia fiziki svobodnoi atmosfery. Pod red. V.IA.Nikandrova. 1963. 338 p. Vol.6.[Section on actinometry and atmospheric optics] Sektsiia aktinometrii i atmosfernoi optiki. Pod red. K.S.Shifrina. 1963. 386 p. Vol.8. [Section on agricultural meteorology] Sektsiia agrometeorologii. Pod red. I.A.Gol'tsberg. 1963. 306 p. (MIRA 16:10)

1. Vsesoyuznoye nauchnoye meteorologicheskoye soveshchaniye. Leningrad, 1961. 2. Glavnaya geofizicheskaya observatoriya, Leningrad (for Shifrin, Gol'tsberg).
(Atmosphere) (Actinometry) (Meteorology, Agricultural)

ACCESSION NR: AT4002178 S/2922/63/005/000/0090/0113

AUTHOR: Shifrin, K. S. (Leningrad); Perel'man, A. Ya. (Leningrad)

TITLE: Kinetics of the crystallization of semidispersed clouds

SOURCE: Vses. nauchn. meteorologich. soveshch. Trudy*, v. 5. Sektsiya fiziki svobodnoy atmosfery*. Leningrad, 1963, 90-113

TOPIC TAGS: meteorology, cloud study, sublimation kinetics, isothermal sublimation, ice crystal spectrum, cloud dispersion, gravitational coalescence, cloud microstructure, Cauchy problem, cloud crystallization

ABSTRACT: The kinetics of sublimation of spherical particles are considered for the case of a super cooled mixed cloud with adequate vertical development (see Fig. 1 of the Enclosure). A simplified and a basic calculation procedure for the process is presented in detail. The motion and curvature of the particles, as well as the spectra of the ice crystals, are ignored in descriptions of isothermic sublimation provided by either procedure. Furthermore, monodispersivity of water droplets is assumed for the simplified procedure and the liquid phase spectrum is considered in the basic procedure. It is shown that corrections for curvature and the crystalline spectrum of the particles

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549410012-4"

ACCESSION NR: AT4002178

can be omitted. Use of formulas from the simplified procedure permits sufficient accuracy in describing the entire process qualitatively and characterizing the effects of numerous physical parameters (Q_0, t, m, n, etc.) on the rate of conversion T*. The latter value depends on those parameters and can be determined directly from input data (see Table 1 of the Enclosure); in practical cloud seeding, m is governed by the quantity of seeded agent, n by cloud structure, and Δc by cloud temperature. The simplified procedure can be used in quantitative calculations for narrow droplet spectra or standard spectra where $Q_0 \lesssim 1.5$ c. The spectra must be considered when greater widths are involved and this represents the most significant correction in the simplified procedure (up to 50% when determining T*). The correction for nonisothermic character is 10-20%, compared to 5-6% for motion of the particles. The basic procedure, when corrected for the two latter factors, describes sublimation of spherical particles accurately to within 3-5%. Orig. art. has: 5 figures, 8 tables, and 101 formulas.

ASSOCIATION: None

SUBMITTED: 00 ATD PRESS: 3056 ENCL: 02

SUB CODE: LS NO REF SOV: 015 OTHER: 002

Card 2/4

ACCESSION NR: AT4002178

ENCLOSURE: 01

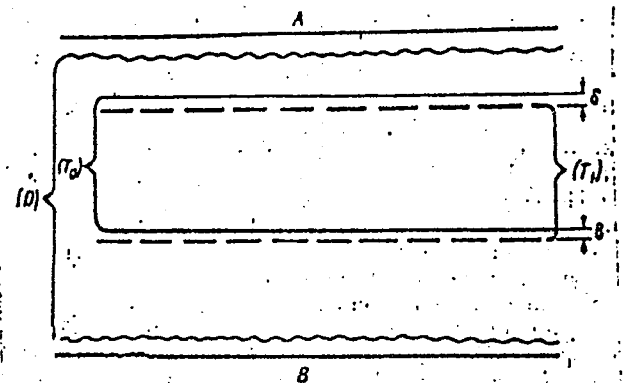

Fig. 1. Cloud area in which sublimation is considered

A and B - cloud boundaries; D - interval cloud area; (T_0) and (T_1) - position of a layer at the inception and termination of sublimation; δ - displacement magnitude.

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ACCESSION NR: AT4002178

ENCLOSURE: 02

TABLE 1 Effect of physical parameters on rate of sublimation ($t = -12°C$, $\alpha = 10\mu$)

Q_o g/m^3	m in cm^{-3},	n in cm^{-3},	b_* in μ	q_* in g/m^3	T_* in sec	ξ in g/cm^3sec
1.0	12	239	30.0	1.224	111	11.36
	2		54.5		376	3.30
0.2	192	48	8.3	0.424	19	22.25
	4		30.2		169	2.83
0.1	3	24	30.5	0.324	235	1.98

ξ is the average rate of sublimation across the total period of evaporation.

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ACCESSION NR: AT4033568 S/2922/63/009/000/0253/0260

AUTHOR: Shifrin, K. S.; Raskin, V. F.

TITLE: The theory of the optical method for the investigation of atmospheric aerosols

SOURCE: Vsesoyuznoye nauchnoye meteorologicheskoye soveshchaniye. 1st, Leningrad, 1961. Pribory* i metody* nablyudeniy (Instruments and methods of observation); trudy* soveshchaniya, v. 9. Leningrad, Gidrometeoizdat, 1963, 253-260

TOPIC TAGS: meteorology, aerosol, atmospheric aerosol, meteorological instrument

ABSTRACT: At the present time there are no sufficiently complete and reliable data concerning the aerosol component of the atmosphere because most existing instruments for measurement of aerosol particles have serious shortcomings; instruments based on the optical method are free of these inadequacies. The optical method makes it possible to make measurements without virtually any disturbance of the aerosol system. The method employs various optical characteristics: angular characteristics of the scattered light -- the indices of scattering, data on spectral transparency of the aerosol volume and polarization characteristics. This article discusses the possibility of determining microstructure from data on these indices and the scattering coefficient (spectral transparency). The direct and inverse

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ACCESSION NR: AT4033568

problems in the theory of scattering are discussed in detail; certain of these have been summarized from earlier papers of the author (Trudy GGO, No. 109, 1961 (two papers); Trudy 2-go soveshchaniya po aktinometrii i atmosfernoy optike, Gidrometeoizdat, Leningrad, 1960). Particular attention is given to the possibility of using data on spectral transparency for solution of the inverse problem. It is shown that by having an experimentally determined spectral transparency curve and using formulas cited in this paper it is possible to obtain a particle-size aerosol distribution curve; the very existence of these formulas is evidence of an unambiguous relationship between the microstructure of an aerosol and spectral transparency. Orig. art. has: 17 formulas and 2 figures.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya (Main Geophysical Observatory)

SUBMITTED: 00 DATE ACQ: 16Apr64 ENCL: 00

SUB CODE: ES NO REF SOV: 005 OTHER: 000

Card 2/2

ACCESSION NR: AT4033571 S/2922/63/009/000/0277/0284

AUTHOR: Shifrin, K. S.; Golikov, V. I.

TITLE: A method and instrument for determination of the microstructure of clouds and precipitation

SOURCE: Vsesoyuznoye nauchnoye meteorologicheskoye soveshchaniye. 1st, Leningrad, 1961. Pribory* i metody* nablyudeniy (Instruments and methods of observation); trudy* soveshchaniya, v. 9. Leningrad, Gidrometeoizdat, 1963, 277-284

TOPIC TAGS: meteorology, meteorological instrument, cloud, cloud structure, fog

ABSTRACT: This article presents the results of development of an optical method for measurement of the microstructure of large-drop clouds and fogs. The method and instrument discussed are based on an analysis of information on the properties of a semidispersive system of cloud and fog drops which is contained in the sectors of the indicatrix corresponding to small scattering angles. The instrument developed for this purpose is the field diffraction structure meter shown in Fig. 1 of the Enclosure. In natural fogs the instrument operates with a modulated signal without a suction device, thereby making it possible to realize the basic advantage of optical methods for measurement of the microstructure of fogs: collection of primary information without mechanical distortions of state of the

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ACCESSION NR: AT4033571

medium. The instrument is designed to measure drops with a radius of 2-40 μ and minimum concentrations of about 100-50 drops per cubic centimeter. The recording of I (β) is accomplished with an automatic PSl-02 electronic potentiometer or a K4-51 photorecorder. The error in photometric measurement of the intensity of scattered light for minimum light fluxes is 10^{-9} lux is no greater than 10%. The instrument was tested in natural fogs in May 1960 at Voyeykovo. The time expended in obtaining one spectrum was from 30 minutes to 1 hour; this required introduction of a special computing device into the photometer electrical system. The computing device decreases the time for computing I (β), increases the accuracy of measurement, and in the process of collection of primary information makes it possible to evaluate the quality of the record of I (β) and its suitability for subsequent processing. Orig. art. has: 5 figures.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya (Main Geophysical Observatory)

SUBMITTED: 00 DATE ACQ: 16Apr64 ENCL: 01

SUB CODE: ES NO REF SOV: 007 OTHER: 001

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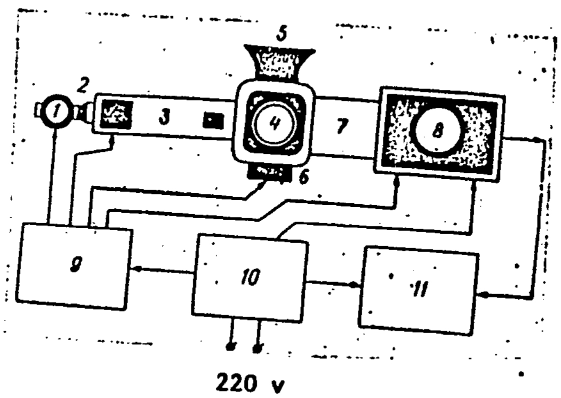
ACCESSION NR: AT4033571

ENCLOSURE: 01



Block diagram of the field diffraction structure meter.
1 - light source; 2 - condenser; 3 - collimating lens; 4 - chamber; 5 - suction device; 6 - fan; 7 - light detector; 8 - scanning device, photometer amplifier; 9 - instrument control panel; 10 - power source; 11 - recorder and computing device.

Card 3/3

SHIFRIN, K.S.; PEREL'MAN, A.Ya.

Determining the spectrum of particles of a disperse system from its transparency characteristics. Part 1: Fundamental equation for determining the spectrum of particles. Opt. i spektr. 15 no.4:533-542 O '63. (MIRA 16:11)

SHIFRIN, K.S.; PEREL'MAN, A.Ya.

Determining the spectrum of particles of a disperse system from its transmittance. Part 2. Opt. i spektr. 15 no.5:667-675 N '63. (MIRA 16:12)

S/0051/63/015/006/0803/0813

ACCESSION NR: AP4009465

AUTHOR: Shifrin, K.S.; Perel'man, A.Ya.

TITLE: Determination of the spectrum of particles in a dispersed system from the data on its transparency. 3. Use of the basic equation in the case of tabular (graphic) specification of the spectral transmittance

SOURCE: Optika i spektroskopiya, v.15, no.6, 1963, 803-813

TOPIC TAGS: transmittance, particle spectrum, dispersed system, spectrum calculations, scattering coefficient, Mellin transform, inverse Mellin transform

ABSTRACT: The present paper is the third of a series (Part I: Opt.i spectr.15, 533, 1963; Part II: Ibid.15,667,1963) describing a method for calculating the spectrum of particles constituting a dispersed system from the spectral transmittance of the system. In the present paper there is considered the case when the transparency data are available in tabular or graphic form. The method is based on applying the Mellin transform to the transmittance data. There are analyzed the specific difficulties encountered in applying the Mellin transform to tabular data. There are derived formulas for calculating the particle spectrum on the basis of tabular or

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AP4009465

graphic data. An appendix gives a derivation of the formulas for the inverse transformation for some typical functions. Orig.art.has: 72 formulas

ASSOCIATION: none

SUBMITTED: 14Feb63	DATE ACQ: 03Jan64	ENCL: 00
SUB CODE: PH,MM	NR REF SOV: 003	OTHER: 000

Card 2/2

L 10743-63 BDS
ACCESSION NR: AP3003554 S/0020/63/151/002/0326/0327

48
41

AUTHOR: Shifrin, K. S.; Perel'man, A. Ya.

TITLE: Computation of particle spectrum using data on spectral transparency

SOURCE: AN SSSR. Doklady, v. 151, no. 2, 1963, 326-327

TOPIC TAGS: optics of turbid media, scattered light, particle spectrum, atmospheric transparency

ABSTRACT: Development of methods for computing the particle spectrum from the information contained in scattered light is one of the leading problems in the optics of turbid media. In systems in which only primary scattering need be considered, the problem is reduced to the inversion of the Fredholm integral equation of the first kind

$$\varphi(y) = \int_0^\infty F(x,y)f(x)dx, \qquad (1)$$

where f(x) is the function of particle distribution by size; F(x,y) is the nucleus of the equation, known from the theory of light scattering on a particle;

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ACCESSION NR: AP3003554

and $\varphi(y)$ is an experimentally determined function. A new, precise inversion of equation (1) has been obtained which imposes only moderate requirements on the accuracy of measurements and eliminates the source of major errors. The particle spectrum is computed solely on the basis of transparency. Computations for numerous examples show that when transparency is measured to an accuracy of 1%, the spectral error is of the order of 5%. The range of wavelengths in which transparency data are required is determined by

$$\lambda_{min} \simeq \beta r_M, \quad \lambda_{max} \simeq 2.5\, \beta r_M, \tag{2}$$

where r_M is the mode of the unknown distribution. For example, for atmospheric aerosol particles at $r_M = 0.1\ \mu$, the transparency measurements should be made in the region from 0.21 to 0.52 μ, and for fog droplets at $r_M = 1\ \mu$, in the region from 2.1 to 5.2 μ. In these estimates the refractive index was assumed to be 1.33. The article was presented by Academician A. A. Lebedev, 25 February 1963. Orig. art. has: 10 formulas.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya im. A. I. Voyeykova (Main Geophysical Observatory)

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SHIFRIN, K. S.; AYVAZYAN, G. M.

"The effect of light scattering on the correct determination of spectral transparency."

report presented at the Atmospheric Radiation Symp, Leningrad, 5-12 Aug 64.

SHIFRIN, K. S.; PERELMAN, A. Yu.

"Determination of the spectrum of small particles by light scattering."
paper presented at the Atmospheric Radiation Symp, Leningrad, 5-12 Aug 64.

ROZENBERG, G. V.; ROMANOVA, L. M.; FEYGELSON, Ye. M.; SHIFRIN, K. S.

"Optical and radiative cloud properties."

paper presented at the Atmospheric Radiation Symp, Leningrad, 5-12 Aug 64.

BR

ACCESSION NR: AP4023377 S/0049/64/000/002/0279/0284

AUTHORS: Shifrin, K. S.; Shubova, G. L.

TITLE: Statistical characteristics of vertical transparency of the atmosphere

SOURCE: AN SSSR. Izv. Seriya geofizicheskaya, no. 2, 1964, 279-284

TOPIC TAGS: turbidity factor, Linke turbidity factor, atmosphere, atmospheric transparency, actinometer, atmospheric circulation

ABSTRACT: The data for analysis were taken from observations on transparency at Karadag in 1942, 1948, and 1949. Observations were made with a Michelson actinometer equipped with OG1 and RG2 Schott filters (yellow and red), the combination of which permitted separation of a spectral region of transmission between 0.509 and 0.644 microns. The authors' model for analysis was based on the wave length 0.550 microns, which lay well within this range. In the analysis the Linke turbidity factor was plotted against a number of observations for which the value feel between -0.05 and +0.05. The summed curve for the three years is shown in Fig. 1 on the Enclosure. It is seen that seven or eight maximums tend to appear on each such curve. These may not all be real because of the possibility that

ACCESSION NR: AP4023377

some may arise through statistical incompleteness of the data. Nevertheless, the general occurrence of six to eight peaks seems constant. This multi-peaked behavior, being repeated on all curves, indicates a substantial and characteristic outbreak of turbulence in the Karadag region, and this must be connected with the type of circulation that prevails in this region. "The authors thank Ye. P. Barashkova, who kindly supplied material on observations of the turbidity factor for 1948 and 1949." Orig. art. has: 4 figures, 2 tables, and 5 formulas.

ASSOCIATION: GUGMS Glavnaya geofizicheskaya observatoriya im. A. I. Voyeykova (GUGMS Main Geophysical Observatory)

SUBMITTED: 08Jun63 DATE ACQ: 27Mar64 ENCL: 01

SUB CODE: AS NO REF SOV: 008 OTHER: 002

Card 2/3

ACCESSION NR: AP4023377

ENCLOSURE: 01

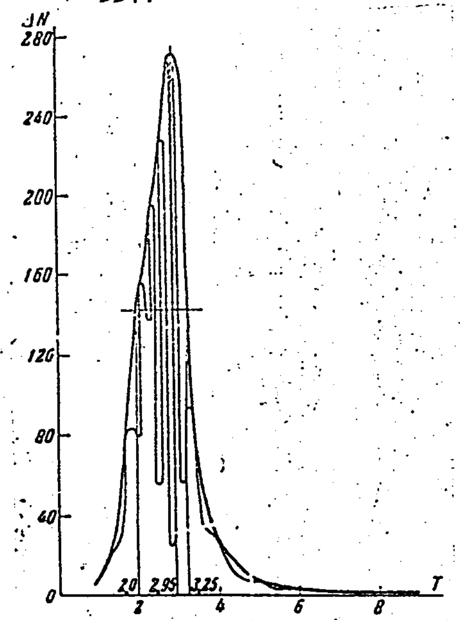

Fig. 1. Summed curve for turbidity-factor distribution for the years 1942, 1948, and 1949 at Karadag.

T - Linke turbidity factor;
N - number of observations for which T falls between -0.05 and +0.05.

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L 14584-66 EWT(1) GW

ACC NR: AT6002611 SOURCE CODE: UR/3112/64/000/006/0005/0053

63
61

AUTHOR: Avaste, O.; Mullamaa, Yu.; Shifrin, K. S.

ORG: /Shifrin/ Main Geophysical Observatory im. A. I. Voyeykov (Glavnaya geofizicheskaya observatoriya)

TITLE: The field of outgoing short wave radiation 12,44,55 in the visible and near infrared spectral regions for the case of a nonorthotropic underlying surface

SOURCE: AN EstSSR. Institut fiziki i astronomii. Issledovaniya po fizike atmosfery, no. 6, 1964, 5-53

TOPIC TAGS: IR radiation, radiation intensity, solar radiation, meteorology, ATMOSPHERIC RADIATION

ABSTRACT: The authors analyze the spatial distribution of reflected radiation intensity in the visible and near infrared spectral regions just above the surface of the sea and at the extreme limit of the atmosphere. The surface of the sea is assumed to be made up of elementary areas whose normals are spatially distributed according to a definite law. A standard plane-parallel atmospheric model is considered. Isophotic maps are plotted for the outgoing radiation as a function of the solar zenith angle and wind velocity and direction. The form of the isophots is

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ACC NR: AT6002611

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strongly dependent on these parameters. Calculations show that the albedo of the reflected solar radiation is only slightly dependent on these parameters at a zenith angle of less than 60°. When the solar zenith angle is greater than 60°, the albedo of the solar radiation increases with the zenith angle, showing a faster increase at low wind velocities. In the visible region of the spectrum, radiation scattered by the atmosphere makes a considerable contribution to the outgoing radiation even in the direction of the sun's glitter pattern. There is a considerable change in the shape of the isophots in the water vapor absorption bands. At solar zenith angles greater than 60°, the maximum intensity of the glitter pattern exceeds the intensity of the outgoing radiation at the nadir in the visible region of the spectrum by a factor of 10, in the near infrared region by 50 times and in the spectral region from 0.4 to 4 μ by a factor of 14. At a zenith angle of 60°, the coefficient of reflection from the surface of the sea in the area of the glitter pattern exceeds the coefficient of reflection at the nadir by a factor of 1,000. The authors are sincerely grateful to V. Kh. Tinn for programming the problem on the computer and for carrying out the calculations and to V. Yu. Kolomiytsev for discussing this work. Orig. art. has: 14 figures, 8 tables, 60 formulas.

SUB CODE: 08/ SUBM DATE: 22Jun64/ ORIG REF: 026/ OTH REF: 022

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Card 2/2

SHIFRIN, K.S.; GOLIKOV, V.I.

Microstructure measurements by the method of small angles. Trudy GGO no.152:3-15 '64. (MIRA 17:7)

SHIFRIN, K.S.; PEREL'MAN, A.Ya.; POTEKHINA, L.K.

Tables for calculating the spectrum of particles of a disperse system on the basis of its transparency. Trudy GGO no.152:192-211 '64. (MIRA 17:7)

SHIFRIN, K.S.; AYVAZYAN, G.M.

Allowing for the scattering indicatrix in transmissivity measurements. Trudy GGO no. 153:132-153 '64. (MIRA 17:9)

SHIFRIN, K.S.; PYATOVSKAYA, N.P.

Short-wave radiation field over typical underlying surfaces. Trudy GGO no.166:3-23 '64.

(MIRA 17:11)

SHIFRIN, K.S.; KOLOMIYTSOV, V.Yu.; PYATOVSKAYA, N.P.

Use of artificial earth satellites in determining the flux of leaving short-wave radiation. Trudy GGO no.166:24-54 '64.
(MIRA 17:11)

ACCESSION NR: AP4011493 S/0051/64/016/001/0117/0128

AUTHOR: Shifrin, K.S.; Perel'man, A.Ya.

TITLE: Determination of the spectrum of particles comprising a dispersed system from the data on its transmittance. 4. Scheme for computation of the particle spectrum when the transmittance data are specified in tabular form

SOURCE: Optika i spektroskopiya, v.16, no.1, 1964, 117-128

TOPIC TAGS: particle spectrum, dispersed system, scattering system, transparency, transmittance, distribution function, particle distribution function, polydispersed system

ABSTRACT: The present paper is the fourth in a series by the authors (K.S.Shifrin and A.Ya.Perel'man, Opt.i spektr.15,533,1963; Ibid.15,667,1963; Ibid.15,803,1963) devoted to calculation of the spectrum of the particles comprising a dispersed system on the basis of experimental data. In the present paper there is proposed a computation scheme for determining the spectrum of particles of any dispersed system from the experimental data on the transmittance. The computation formulas adduced and derived in the preceding papers are adopted to the present case. The computation

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ACC.NR: AP4011493

scheme is relatively simple and its application does not require understanding of the mathematical formalism underlying the method. A number of illustrative examples are considered. The range of wavelength in which transparency data must be obtained in order to arrive at acceptable results is indicated. An evaluation of the accuracy of the computation scheme is given in the appendix. The advantage claimed for the proposed procedure as compared with other computation methods is that it yields a precise solution of the problem of determining the particle size spectrum from tabulated data on scattering without any a priori assumptions regarding the distribution. Orig.art.has: 87 formulas and 7 tables.

ASSOCIATION: none

SUBMITTED: 14Feb63 DATE ACQ: 14Feb64 ENCL: 00

SUB CODE: PH NO REF SOV: 006 OTHER: 001

Card 2/2

ACCESSION NR: AP4042987 S/0051/64/017/001/0113/0118

AUTHOR: Shifrin, K. S.,

TITLE: Pressure of light on water drops

SOURCE: Optika i spektroskopiya, v. 17, no. 1, 1964, 113-118

TOPIC TAGS: light particle interaction, light pressure, light scattering, droplet light interaction, light energy transfer

ABSTRACT: The article aims to extend the Debye general formula for determining the pressure of light on small particles (Am. Phys. 30, 57, 1909) to finding the pressure cross section on transparent particles, a problem which the authors believe has not been solved heretofore. The analysis is applied to water drops as the most common of transparent particles. The authors analyze first the phenomenon of energy transfer under conditions of light scattering by particles in general terms, considering separately its two stages: (1) the transfer of energy from the field to the particle, and (2) the "reradiation"

ACCESSION NR: AP4042987

of energy from the particle, both assumed to occur in form of exchange of energy impulses. The measure of the reradiated energy is the luminosity of scattered light, from which the component of scattered energy in the direction of its propagation can be deduced. According to this method, the balance of energy transferred from field to particle is the difference between the two impulses: the initial field-to-particle and the secondary particle-to-field impulse. The absorption of energy by a particle, if any, is accounted for. The result of this analysis is applied to particles of limit smallness both of the Rayleigh type and the fully reflecting type, as well as to spheres of limit largeness. Finally, the analysis is applied to determining light pressure cross sections for particles of intermediate dimensions, with calculations carried out on electronic computers, and the results are presented in the form of graphs and a table showing the values of pressure cross sections as a function of drop sizes within the visible range of the spectrum. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: none

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ACCESSION NR: AP4042987

SUBMITTED: 02Aug63 ATD PRESS: 3085 ENCL: 00

SUB CODE: OP, ME NO REF SOV: 002 OTHER: 004

Card 3/3

S/0020/64/154/004/0824/0826

ACCESSION NR: AP4012967

AUTHORS: Shifrin, K.S.; Ayvazyan, G.M.

TITLE: Effect of dispersion index upon transparency

SOURCE: AN SSSR. Doklady*, v. 154, no. 4, 1964, 824-826

TOPIC TAGS: meteorology, dispersion index, transparency, transparency measurement, thunderstorm electricity, cloud study, atmospheric precipitation

ABSTRACT: Authors' purpose was to point out a method of corrections when calculating the dispersion index when computing transparency, and to estimate the effect for concrete and typical cases. It was assumed that the medium under examination is sufficiently transparent, so that study was limited to single scattering. Three typical cases were examined. In the case of a parallel beam, the attenuation factor can be determined by a precise formula

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$$\alpha_1 = \frac{1}{L} \ln \frac{E_0}{E_1}. \quad (1)$$

The correction factor will be

$$\Delta\alpha = \alpha_1 - \alpha = \frac{1}{L} \ln (1 + c), \quad c = \frac{E_2}{E_1}. \quad (2)$$

where E_1 is the theoretically calculated intensity and E_2 is the scattered "parasitic" intensity. E_1 can be found by the formula

$$E_1 = E_0 e^{-n\alpha_1 L};$$

and E_2 by the general formula (3)

$$E_2 = \frac{F_2}{S} = \int_V n \frac{1}{\rho^2} \cos\psi I(\beta)\, e^{-n\alpha_1\rho} dV. \quad (4)$$

In the case of a parallel beam, introducing the cylindrical coordinates (χ, R) and representing the dispersion index $I(\beta)$ in the form

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ACCESSION NR: AP4012967

$$I(\beta) = I_0 \Phi(\beta), \tag{5}$$

$$I_0 = J \frac{\pi \Gamma(\nu + 5) \bar{a}^4}{(\nu + 1)^4 \lambda^2 \Gamma(\nu + 1)} \tag{6}$$

(I_0 - light instensity scattered directly forward; $\Phi(\beta)$ - angular distribution of scattered beam intensity) the following are valid

$$E_2 = B' e_2', \quad B' = \frac{2\pi^2}{\lambda^2} n \bar{a}^4 Y_\nu E_1, \quad Y_\nu = \frac{\Gamma(\nu + 5)}{(\nu + 1)^4 \Gamma(\nu + 1)} \tag{7}$$

$$e_2' = e^{n\alpha_\nu L} \int_0^L (L - x) e^{-n\alpha_\nu x} dx \int_0^{R_{max}} \frac{R \Phi(\beta) e^{-n\alpha_\nu \rho} dR}{[R^2 + (L - x)^2]^{3/2}} \tag{8}$$

The values for $\Phi(\beta)$ were calculated by a theory previously de-

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ACCESSION NR: AP4012967

veloped by K.S. Shifrin (Sborn. Issledovanie oblakov, ocadkov i grosovogo electrichestva [Collection. Analysis of clouds, precipitation and thunderstorm electricity], Leningrad, 1957; Vsesoyuzu. gaochu. lesotekln. inst., no. 2, 1956; Tr. Glavn. geofiz. obs., vol. 100, 1960). Three cases with a parameter ν of 2,5 and 10 and wavelength λ of 0.5, 3 and μ were examined. Orig. art. has: 1 figure, 1 table and 16 equations.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya im. A.I. Voseykova (Main geophysical observatory); Institut radiofiziki i elektroniki Akademii nauk Arm SSR (Institute of radiophysics and electronics of the Academy of Sciences Arm SSR

SUBMITTED: 05Oct63 DATE ACQ: 26Feb64 ENCL: 00

SUB CODE: AS, PH NO REF SOV: 004 OTHER: 00

Card 4/4

L 52505-65 EWT(1)/EWG(v)/FCC/EEC(t) Pe-5/Pi-4 GS/GW

ACCESSION NR: AT5011157 UR/0000/64/000/000/0067/0077

38
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B+1

AUTHOR: Shifrin, K.S.; Perel'man, A. Ya.

TITLE: Computation of the particle spectrum using data on spectral transparency

SOURCE: Mezhvedomstvennoye soveshchaniye po aktinometrii i optike atmosfery, 5th, Moscow, 1963. Aktinometriya i optika atmosfery (Actinometry and atmospheric optics); trudy soveshchaniya. Moscow. Izd-vo Nauka, 1964, 67-77

TOPIC TAGS: atmospheric optics, atmospheric transparency, scattered light, aerosol, particle spectrum

ABSTRACT: Determination of the particle spectrum of a disperse system from data on light scattering is a timely problem in the optics of turbide media. The purpose of this article was to develop a method for the transformation of data on spectral transparency. The basic approach to a solution of the most important case of "soft" particles was given earlier (K.S. Shifrin and V.F. Raskin, Optika i spektroskopiya, 1961, 11, 268). However, due to the poor stability of transformation problems, the direct numerical computations by means of the formula given in the earlier paper is virtually impossible. Computations are possible only after eliminating the factors responsible for the instability of the solution. This problem is solved in the present paper. The approach given

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ACCESSION NR: AT5011157

here in detail makes it possible to compute the spectrum of particles of the system solely on the basis of data on its transparency without making any additional assumptions concerning the character of the spectrum. The paper is divided into 10 sections: 1. Introduction. 2. Inversion formula. 3. Computation of the parameter L(p). 4. Basic equation. 5. Use of the principal equation in the case of tabulated transparency values. 6. Broadening of the principal band. 7. Use of the principal equation for a case of analytical stipulation of transparency. 8. Computation of the particle spectrum for tabular (graphic) stipulated transparency. 9. Evaluation of the accuracy of the computation method. 10. Spectral region and Conclusion. The developed method gives a precise solution of the problem of determining the particle spectrum from information contained in scattered light. It is considerably superior to methods in which the system is related a priori to some distribution and information on scattering is used to determine the unknown characteristics of this distribution. Orig. art. has: 41 formulas, 1 firugre and 3 tables.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya, Leningrad (Main Geophysical Observatory)

SUBMITTED: 25Nov64 ENCL: 00 SUB CODE: OP, ES

NO REF SOV: 010 OTHER: 001

Card 2/2 LL

SHIFRIN, K.S.; PEREL'MAN, A.Ya.

Reversion of the indicatrix for "soft" particles. Dokl. AN SSSR 158 no.3:578-581 S '64. (MIRA 17:10)

1. Glavnaya geofizicheskaya observatoriya im. A.I.Voyeykova i Vsesoyuznyy zaochnyy lesotekhnicheskiy institut. Predstavleno akademikom A.A. Lebedevym.

L 44743-65 EPF(c)/EWT(1)/EEC(t) Pi-4 IJP(c) GG/WW
ACCESSION NR: AP5011124 UR/0051/65/018/004/0690/0697

27
B

AUTHOR: Shifrin, K. S.

TITLE: Light pressure on particles of different substances

SOURCE: Optika i spektroskopiya, v. 18, no. 4, 1965, 690-697

TOPIC TAGS: light pressure, refractive index, turbid medium, saturation, optical radiation transfer

ABSTRACT: Results are presented of the calculation of the diameter of light pressure on small particles of various substances (the light-pressure diameter is defined as the coefficient K in the formula $F = \pi a^2 KI/c$ for the pressure force, where a is the particle radius and I the intensity of the radiation). This problem is of interest in connection with the transport of radiation in media with a high degree of turbidity. The values of the diameter are calculated for different particle refractive indices (m) ranging from 0.90 to infinity. Plots of the light-pressure diameter against the quantity $\rho = 2\pi a/\lambda$ (λ is the radiation wavelength) were quite similar for all values of m, if the details of the fine structure were neglected. The light conditions inside the medium are investigated for the case when the absorption of light involves dissipation of the kinetic energy acquired by the

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ACCESSION NR: AP5011124

particles as a result of the light-pressure forces. The results show that such a medium can exhibit saturation, wherein the light intensity cannot exceed a certain limit no matter how strong the illumination. Orig. art. has: 5 figures and 12 formulas. [02]

ASSOCIATION: none

SUBMITTED: 13Feb64 ENCL: 00 SUB CODE: OP

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Card 2/2

L 64322-65 EWT(1)/EWG(v)/FCC GW

ACCESSION NR: AP5022921 UR/0362/65/001/009/0964/0972
551.521.3

35
32
B

AUTHOR: Shifrin, K. S.; Perel'man, A. Ya.

44,55 44,55

TITLE: Stability of the computational scheme in processing light-scattering data

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 9, 1965, 964-972

TOPIC TAGS: light scattering, transparency method, turbid layer, turbidity, particle distribution, atmospheric optics

44,55,12

ABSTRACT: The effect of incomplete and inaccurate optical data concerning the turbid layers on the precision of determining the function of particle distribution by means of the transparency and scattering pattern method is examined. A direct check, based on theoretical models, of the stability of the two methods is applied to the mechanism of the computational scheme. Questions related to the validity of the physical assumptions made in the construction of the model of the turbid medium in both the transparency and the indicatrix methods are not discussed. The results of computations show that both methods make it possible to calculate the function of particle distribution of the dispersion system from appropriate optical data with an acceptable degree of accuracy. On the basis of the analysis of typical examples

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ACCESSION NR: AP5022921

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recommendations are made with respect to a rational selection of the wavelengths of the spectral intervals (angle intervals) and the number of transparency measurements (angles). Orig. art. has: 31 formulas, 5 figures, and 2 tables. [DM]

ASSOCIATION: Glavnaya geofizicheskaya observatoriya im. A. I. Voyeykova (Main Geophysical Observatory) 44,55

SUBMITTED: 29Mar65 ENCL: 00 SUB CODE: ES, OP

NO REF SOV: 004 OTHER: 000 ATD PRESS: 4013

Card 2/2

L 1816-66 EWT(1) GW

ACCESSION NR: AT5025225

UR/2531/65/000/170/0003/0036

AUTHOR: Shifrin, K. S.; Perel'man, A. Ya.
44,55 44,55

84
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TITLE: Computing the spectrum of particles from data on the transparency of a dispersed system

SOURCE: Leningrad. Glavnaya geofizicheskaya observatoriya. Trudy, no. 170, 1965. Issledovaniye radiatsionnykh protsessov v atmosfere (Investigation of radiation processes in the atmosphere), 3-36

TOPIC TAGS: longwave radiation, 44,55 dispersed system, soft particle scattering, transparency, polydispersed scattering

ABSTRACT: The authors discuss a precise method for determining the spectrum of soft particles in a dispersed system, which is based on an experimental determination of the system's transparency (a function of the relationship between the coefficient of polydispersed scattering and wavelength). Exact formulas are derived for a one-to-one transformation for the direct and inverse problem of single scattering by soft particles true for a general case of an arbitrarily scattered system. Computations are presented for the basic transformations, asymptotic evaluation of transparency for large wave numbers, derivation of general transformation

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formulas for experimentally determined input functions, coefficients, selection of a unit scale and the steps of a quadrature formula, derivation of working formulas for computing the spectrum of particles, gamma distributions ($\mu = 0$) and ($\mu > 0$, μ is an integer), computation of particle spectra from experimentally determined transparency, and verification of transformation formulas using experimentally derived input data. Numerous examples are cited to illustrate the rigidity of the computational scheme. Tables are included to facilitate computation. Orig. art. has: 14 formulas, 13 tables, and 8 figures. [SP]

ASSOCIATION: Glavnaya geofizicheskaya observatoriya, Leningrad (Main Geophysical Observatory) 44,55

SUBMITTED: 00 ENCL: 00 SUB CODE: ES, NP

NO REF SOV: 008 OTHER: 001 ATD PRESS: 4111

Card 2/2

L 3642-66 EWT(1)/FCC GW

ACCESSION NR: AT5025226 UR/2531/65/000/170/0037/0060

44
41
B+1

AUTHOR: Shifrin, K. S.; Perel'man, A. Ya.

44,55 44,55

TITLE: Spectral transparency of almost monodispersed systems

SOURCE: Leningrad. Glavnaya geofizicheskaya observatoriya. Trudy, no. 170, 1965. Issledovaniye radiatsionnykh protsessov v atmosfere (Investigation of radiation processes in the atmosphere), 37-60

TOPIC TAGS: atmospheric optics, 12,44,55 atmospheric transparency, particle size distribution, polydispersion, monodispersion, transparency spectrum, light scattering, atmospheric scattering

ABSTRACT: The effect of the parameters of polydispersion, particularly the width of distribution Δr, on the transparency of the system is investigated. Monodispersed scattering of light is regarded as the limiting case of polydispersed scattering, which can be represented by a series of delta-shaped distribution curves whose properties are used to compute, by a modified saddle-point method, the integral representing the polydispersed scattering coefficient. Scattering in an almost monodispersed system is regarded as monodisperse with a correction factor. Analysis begins with consideration of a polydispersed system of particles whose optical properties differ little from those of the surrounding medium.

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Changes in the spectral transparency of the system are investigated along two lines. In the first, different distribution widths are considered for constant mean-square radius $\overline{r_2}$ (transparency remains constant for small λ). In the second line of investigation, the mode of the distribution r_M is fixed. Formulas are derived for determining transparency with constant $\overline{r_2}$ and r_M. It is assumed that the particle-size (radii) spectrum is described by a gamma-distribution and the scattering cross section is an arbitrary analytic function whose argument is proportional to the product $r\nu$ (ν is the wave number). An expression is derived for the optical characteristics (for example, transparency) of almost monodispersed systems. The range of applicability of these formulas is evaluated. Calculations are presented which illustrate details of the spectral structure of transparency as the distribution width is narrowed (transition to the monodispersed case). The connection between dimensionless characteristics of transparency for different linear scales is established, and a formula is derived for determining transparency when the linear scale is changed. Curves of the spectral transparency of different polydispersed systems are presented to illustrate the application of the formulas. Orig. art. has: 9 figures, 136 formulas, and 4 tables. [EO]

ASSOCIATION: Glavnaya geofizicheskaya observatoriya, Leningrad (Main Geophysical Observatory)

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Card 3/3

L 3870-66 EWT(1) GW
ACCESSION NR: AT5025227 UR/2531/65/000/170/0061/0070 31 28 B+1

AUTHOR: Shifrin, K. S.; Zel'manovich, I. L.
44,55 44,55

TITLE: Matrix for calculating the coefficients of backward scattering

SOURCE: Leningrad. Glavnaya geofizicheskaya observatoriya. Trudy, no. 170, 1965, Issledovaniye radiatsionnykh protsessov v atmosfere (Investigation of radiation processes in the atmosphere), 61-70

TOPIC TAGS: electromagnetic wave scattering, backward scattering coefficient

ABSTRACT: The authors give the elements of the matrix necessary for calculating backward scattering. The basic formula for calculating the coefficient of backward scattering was derived by one of the authors in a previous paper (K. S. Shifrin, "On Calculating the Radiation Properties of Clouds", Trudy GGO, No 46(108), 1955):

$$k'_p = \pi a^2 K'_p, \quad K'_p = \frac{2}{\rho^2} \operatorname{Re}\left\{(BC^*) + \sum_{m>l} \eta_{l,m}\right\} + \frac{1}{2} K_p. \quad (1)$$

Here

$$B = \sum_{l=1}^{\infty} f_l b_l, \quad C = \sum_{l=1}^{\infty} f_l c_l; \quad (2)$$

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$$\eta_{l,m} = x_{l,m}(c_l c_m^* + b_l b_m^*). \quad (3)$$

These formulas considerably simplify the calculations since they express the coefficient of backward scattering in a manner similar to the formula used by Mie for expressing the coefficient of total scattering through the amplitudes of the partial waves b_l and c_l, eliminating calculation of the scattering curve. There are two auxiliary quantities which appear in these formulas: the matrix $x_{l,m}$ and the column f_l. These quantities are defined by the expressions

$$f_l = \begin{cases} 0 \\ \dfrac{(-1)^{\frac{l-1}{2}} l!!}{2^{\frac{l-1}{2}} \left(\frac{l-1}{2}\right)!} \end{cases} \quad (4)$$

$$x_{l,m} = \frac{(m+1)(l+1)}{l(l+1) - m(m+1)} \{ m f_m f_{l-1} - l f_l f_{m-1} \}. \quad (5)$$

Tables are given for these quantities for l up to 100 to seven significant figures. Orig. art. has: 5 formulas, 1 table.

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ACCESSION NR: AT5025227

ASSOCIATION: Glavnaya geofizicheskaya observatoriya (Main Geophysical Observatory)

44,55

SUBMITTED: 00 ENCL: 00 SUB CODE: ES

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APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549410012-4"

L 3883-66 EWT(1)/FCC GW

ACCESSION NR: AT5025230 UR/2531/65/000/170/0093/0104 30 17 B+1

AUTHOR: Shifrin, K. S.; Chayanova, E. A. 44,55 44,55

TITLE: Indicatrices for Junge distribution and distribution of the Junge type

SOURCE: Leningrad. Glavnaya geofizicheskaya observatoriya. Trudy, no. 170, 1965. Issledovaniye radiatsionnykh protsessov v atmosfere (Investigation of radiation processes in the atmosphere), 93-104

TOPIC TAGS: particle distribution, aerosol 12,44,55

ABSTRACT: The author calculates the polydisperse indicatrices for Junge distribution and distribution of the Junge type:

$$f(a)=\begin{cases}0 & a<a_{\min}\\ Aa^{-\nu} & a_{\min}<a<a_{\max}\\ 0 & a>a_{\max}\end{cases} \quad (1)$$

The normalization factor can be expressed as

$$A=Na_{\min}(\nu-1)\varepsilon(R). \quad (2)$$

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ACCESSION NR: AT5025230

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where N is the number of particles per cm^3, $R = \frac{a_{max}}{a_{min}}$, $\varepsilon(R) = \frac{1}{1 - \frac{1}{R^{\nu-1}}}$. The normalized indicatrices are calculated. The parameter A does not figure in these indicatrices. The values of ν, a_{min} and a_{max} were chosen on the basis of experimental works on the spectrum of the atmospheric aerosol. A formula is derived for finding the normalized polydisperse indicatrices and the results of calculation using this formula are tabulated. Some of the results of the calculations are analyzed in more detail. Orig. art. has: 3 figures, 17 formulas, 4 tables.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya (Main Geophysical Observatory) 44,55

SUBMITTED: 00 ENCL: 00 SUB CODE: ES

NO REF SOV: 007 OTHER: 016

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L 3884-66 EWT(1)/FCC GW

ACCESSION NR: AT5025231 UR/2531/65/000/170/0105/0114 26 23 B+1

AUTHOR: Kasatkina, O. I.; Shifrin, K. S.
44,55 44,55

TITLE: The scattering indicatrix for light dispersed by a system of spherical particles

SOURCE: Leningrad. Glavnaya geofizicheskaya observatoriya. Trudy, no. 170, 1965. Issledovaniye radiatsionnykh protsessov v atmosfere (Investigation of radiation processes in the atmosphere), 105-114

TOPIC TAGS: light scattering, aerosol
17, 44,55

ABSTRACT: The authors consider the problem of determining the indicatrix for light scattering in a system of spherical particles, specifically in clouds and mists. The available data which are necessary for calculating these indicatrices are evaluated. Examples are given for calculation of the indicatrix of light scattering for an individual particle with an index of refraction $m = 1.335$ for $\rho = \frac{2\pi r}{\lambda} = 59$, 60 and 61, where r is the radius of the particle. Calculation and analysis shows that the data necessary for calculating the indicatrix of light scattering in aerosol

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systems must be obtained experimentally. Orig. art. has: 5 figures, 9 formulas, 3 tables.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya (Main Geophysical Observatory) 44,55

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L 3886-66 EWT(1)/FCC GW

ACCESSION NR: AT5025233 UR/2531/65/000/170/0127/0139

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24
B+1

AUTHOR: Shifrin, K. S.; Golikov, V. I.
44,55 44,55

TITLE: An instrument for measuring particle spectra by the small angle method

SOURCE: Leningrad. Glavnaya geofizicheskaya observatoriya. Trudy, no. 170, 1965. Issledovaniye radiatsionnykh protsessov v atmosfere (Investigation of radiation processes in the atmosphere), 127-139

TOPIC TAGS: aerosol, particle spectrum, photometric analysis

ABSTRACT: A model of a field instrument for measuring the microstructure of mists 12,44,55 by the small angle method was built at the Main Geophysical Observatory in 1959-1960. The instrument was tested using aerosol models in the cloud chamber of the High-Altitude Geophysics Institute 44,55 (Terskol) and in natural mists (Voyeykovo). The spectra ~~taken with~~ this device coincide satisfactorily with those of flow-type collectors and photomicrographs. The tests made in 1959-1960 showed that fluctuations in the spectrum of water drops in space and time make it difficult to evaluate the accuracy of measurements when working with mists. Therefore more detailed studies of the instrument were made using artificial aerosol models of known microstructure. These

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studies were made in 1961-1963. The aerosol models and photometric methods are described. Measurements with a special instrument showed that the photometric data obtained in these tests were accurate to better than 10%, reaching 1% in favorable circumstances. The results of tests with plane and volumetric aerosol models are analyzed and the spectra obtained by optical and photomicrographic methods are compared. It is found that the optical method gives completely satisfactory results. As a first step toward automatic analysis of the experimental data, the "Ural-1" computer was programmed for taking the spectra of a number of aerosol models. Plans are being made to design an analog or analog-digital computer for automatic analysis of these data. Orig. art. has: 2 figures, 10 formulas, 1 table.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya (Main Geophysical Observatory) 44,55

SUBMITTED: 00 ENCL: 00 SUB CODE: ES

NO REF SOV: 009 OTHER: 000

Card 2/2

SHIFRIN, K.S.; SHUBOVA, G.L.

Variability of vertical transparency. Trudy GGO no.170:181-187 '65.
(MIRA 18:9)